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TITLE: Two-Sided Roll Support with Multiple Ribs

INVENTOR(S)

Jeffrey J. Gratz
Germantown, WI

ASSIGNEE (if applicable)

Fibreform Container, Inc.
Germantown, WI

ENTITY: Small

CUSTOMER NUMBER:

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Constance S. Rogers

TWO-SIDED ROLL SUPPORT WITH MULTIPLE RIBS

Background Of The Invention

1. Field of the Invention.

The present invention relates to structures for the packaging of cylindrical structures. More particularly, the present invention relates to fabricated supports for stabilizing the position of cylindrical structures, such as rolls of material, and other structures having at least some cylindrical features, during transport.

2. Description of the Prior Art.

Web materials such as plastic film are used for a variety of purposes including the sealing of other materials. Web materials are typically fabricated in roll form and used in their particular applications in the same form. However, such cylindrical products are often difficult to transport because they can become displaced relatively easily when subject to the conditions of roadway travel. In addition, it is undesirable to stack heavy cylindrical objects directly on one another because their weight can cause deformation. For that reason, cylindrical objects such as web rolls are ordinarily retained by supports that space adjacent ones apart and prevent rolling movement. Such supports must be fabricated so that product damage is minimized. Failure to minimize damage during transport can cause defects that prevent use of the product for its intended purpose. Further, since it is most efficient to stack multiple layers of product for a single transport effort, the support must be strong enough to enable multi-layered stacking that does not cause product deformation.

Some supports for cylindrical products have been fabricated of polystyrene. The polystyrene supports generally provide sufficient strength to adequately protect a plurality of web rolls, for example, stacked together for transport. However, it is well known that polystyrene and other polymeric-based products are generally perceived as environmentally undesirable in that they are stable and unlikely to degrade over a long period. For that reason, there has been increasing interest in fabricating such web supports, and other sorts of

packaging for that matter, that are fabricated of more nature-friendly materials, including recyclable materials, including pulp-based supports. Examples of molded pulp supports are described in U.S. Patent Nos. 5,899,331 and 5,934,467. Those references describe molded roll supports having recesses and depressions that provide structural strength to the rolls and that also provide retention sites for cradling the rolls to be transported.

For the most part, the present molded supports have only one side (the smooth side) configured to support products having cylindrical characteristics, while the other side (the rough side) is designed to provide suitable structural support. In order to enable multi-layer stacking, the molded supports are formed of pairs of support structures hingedly connected together so that the smooth sides face outwardly while the rough sides are placed back-to-back. In that way, the rolls to be supported come in contact only with the smooth sides of the double, hinged, support.

Unfortunately, the supports that presently exist are not completely effective in preventing roll damage during transport. Specifically, the support materials have some compressibility so that when a plurality of relatively heavy objects are placed on them, there is some thickness reduction. In addition, it is ordinary practice for transporters to place banding straps around the perimeter of a stack of objects. The banding is tightened to prevent individual objects in the stack from slipping. However, that tightening causes additional compression of the support material, particularly the hinged support structures. During transport, that additional compression that occurs after banding can result in less than complete retention of individual objects. As a result, the banding is loosened and the objects are prone to spinning and other forms of displacement that can cause in damage.

Therefore, what is needed is a cylindrical object support that provides suitable retention capability to minimize object movement throughout the transport process. What is also needed is such an object support that can be fabricated of conventional materials including, but not limited to, pulp-based materials. Further, what is needed is such an object support that can be used to retain multiple

stacks of objects with a reduction in the types of compressive characteristics experienced by hinged supports.

Summary Of The Invention

It is an object of the present invention to provide a cylindrical object support that provides suitable retention capability to minimize object movement throughout the transport process. It is also an object of the present invention to provide such an object support that can be fabricated of conventional materials including, but not limited to, pulp-based materials. Further, it is another object of the present invention to provide such an object support that can be used to retain multiple stacks of objects with a reduction in the types of compressive characteristics experienced by hinged supports.

These and other objects of the present invention are achieved through the unique design of a cylindrical object support formed in a single layer and providing greater surface contact area between the support and the objects to be supported. The support of the present invention has a first support surface and a second support surface. The support is an elongated member having a pair of rib regions running parallel to one another on the first support surface. The ribs each include alternating arches and depressions, terminating at the ends of the elongate member with terminating arches that act to prevent end rolls from falling off. The terminating arches remain part of opposing end walls that define the end perimeter of the elongated member. The ribs are spaced from one another by an inner valley and each of the ribs of the first side is adjacent to an outer valley that are adjacent to side walls of the first side.

On the second side of the elongated member, the valleys of the first side are three ribs in parallel that are also configured as respective series of alternating arches and depressions. The depressions of the ribs of the first side define the positioning of the underside of a web product to be retained by the support on that side. For that reason, the depressions of the parallel ribs are aligned. Similarly, the depressions of the second side are designed to retain the topside of a web product and so are also aligned. In particular, the arches of the

first side substantially define the configuration of the depressions of the second side and the depressions of the first side substantially define the configuration of the arches of the second side. The combination of multiple ribs on the first side and multiple ribs on the second side result in a single-piece web support that retains adjacent sets of objects on each of its sides. The arches of the ribs are preferably of height greater than existing support structures to ensure no slip-out of objects during transit. That is, they provide more surface area contact with the object along a greater extent of the circumference of the object. In addition, the support of the present invention is relatively wider than corresponding supports for equivalent objects. The combination of the relatively taller rib arches and wider structure adds to the overall critical surface area contact between the support and the objects being supported. For the purpose of this disclosure, the critical surface area is that area of contact associated with the interface between the support and where adjacent objects are stacked atop one another.

In order to further minimize the possibility of loosening of a banded stack of objects, the present invention includes lands at the tops of the arches of the ribs of the first side. The lands are preferably configured with cavities that reinforce the structural strength of the land that defines the upper dimensions of the arches. Specifically, while a flat land provides some structural strength to the ribs, adding a cavity to a land increases the transverse strength by effectively adding more surface area to the lands within the same space. The cavities essentially create two lands rather than a single land component. Adjacent objects positioned on the first side of the support meet substantially greater resistance to inward movement due to the cavity-inclusive configuration of the lands. That ensures that the adjacent objects are much less likely to move inwardly toward the middle of the stack due to excessive compression of the support in that localized region.

The present invention provides an improved object support that enables the stacking and retention of cylindrical and semi-cylindrical objects without resorting to hinged or otherwise double-configured structures. These and other advantages of the present invention will become apparent upon review of the following detailed description, the accompanying drawings, and the claims.

Brief Description of the Drawings

FIG. 1 is a simplified perspective view of the first side of the support of the present invention shown on a plurality of rolls supported by the second side thereof.

FIG. 2 is a simplified perspective view of the second side of the support of the present invention shown without the plurality of rolls thereon.

Detailed Description Of The Preferred Embodiment Of The Invention

An object support structure **10** of the present invention is shown in FIGS. 1 and 2. The structure includes a first side **11** and an opposing second side **12**. Either or both of the two sides may be molded with a smooth design or a rough design. The structure **10** is preferably fabricated of moldable pulp fiber material but may also be fabricated on non-metallic polymeric material, such as plastic sheet, for example. The structure **10** is of selectable length **L** and width **W** sufficient to ensure that two spaced rib sections may be established on said first side **11**. The first side **11** includes opposing first sidewalls **13** and **14** and two opposing endwalls **15** and **16**. The sidewalls and endwalls define the perimeter of the elongate structure that is the roll support structure **10**.

The structure **10** includes on the first side **11** a first rib section **17** and a second rib section **18** that is substantially parallel to the first rib section **17**. The first rib section **17** and the second rib section **18** are spaced apart from one another by an inner valley **19** and they are spaced from the sidewalls **13** and **14** by outer valleys **20** and **21**, respectively. All of the valleys are preferably of substantially the same configuration. Each of the rib sections **17** and **18** includes an alternating series of two or more interior arches **22** and semi-cylindrical depressions **23**. The arches **22** and the depressions **23** are preferably sized and configured to retain securely within the depressions **23** rolls **24** so that the contact area of the depressions **23** to the rolls **24** is substantial. Although rolls of web material are shown being retained by the support **10**, it is to be understood that the support **10** may be employed to retain other objects having cylindrical design.

Continuing with the example, for a roll having a diameter **D**, the completed circle defined by the circumference of the depressions **23** preferably has a diameter greater than **D** and the arches **22** are of a height sufficient to produce adequate contact with the rolls **24**. For example, for a roll having a diameter equal to about 10", the arches **22** should be at a height of at least about 1.75". It is to be noted that at least the depressions **23** of the respective rib sections **17** and **18** are to be substantially aligned with one another so that the rolls **24** may reside therein.

With continuing reference to FIG. 1, the first side **11** of the structure **10** further includes a first set of end arches **25** and a second set of end arches **26** that are adjacent to and form a part of endwalls **15** and **16**, respectively. They are preferably about the same height as the arches **22**, but in some instances may be taller if desired. Additionally, the inner arches **22** preferably each includes a land **27** that defines the height of the respective inner arches. Each land **27** provides structural reinforcement to the rib sections **17** and **18** and has a substantially centered cavity **28** spaced between two top sections of the individual lands **27**. These cavities **28** enhance the structural characteristics of the individual arches **22**, preventing excessive compression of that portion of the structure **10**, particularly in the center of the structure **10** during full loading.

As illustrated in FIG. 2, the second side **12** of the structure **10** is a modified inverted version of the first side **11**. In particular, the second side **12** includes a set of parallel rib sections **29-31** that correspond to the valleys **19-21** of the first side **11**. The rib sections **29-31** include a series of alternating peaks **32** and depressions **33**. Although the peaks **32** may have lands, they do not in the preferred embodiment of the present invention, as that would affect the design of the first side **11** to an extent. The second side **12** is designed to retain within the aligned depressions **33** what would effectively be the topside of the rolls **24**, essentially as shown in FIG. 1. On the other hand, the first side **11** is designed to retain thereon the underside of the rolls **24**. The peaks **32** are sufficiently sized in height to aid in retaining the rolls within the depressions **33**. It is to be noted that the rib sections **29-31** are spaced apart from one another by second side valleys

that correspond to the underside configuration of the arches **22** and their lands **27** of the first side **11**. The structure **10** of the present invention is relatively wider than corresponding supports of the prior art to ensure that multiple ribs may be fabricated into the second side **12**. That wider design in combination with relatively taller ribs produces substantially greater critical surface area contact of the structure **10** with whatever objects are being supported thereon.

The roll support structure **10** of the present invention provides an improved support that enables the stacking and retention of cylindrical objects without resorting to double-configured structures. The structure **10** is formed of a single layer and improved structural features to minimize compression and increase surface area contact. While the invention has been described with reference to a particular example embodiment, it is intended to cover all modifications and equivalents as described in the following claims.